

CLAIMS

5 1. A composite substrate for use in flat panel displays, packaging or electro luminescence lamps comprising:

a plastic substrate; and

a first conductive barrier material deposited over the plastic substrate, the conductive barrier material including one of a thin transparent conductive oxide, and a metal nitride.

10 2. The composite substrate of claim 1 further comprising a first organic polymer deposited over the plastic substrate.

15 3. The composite substrate of claim 1 further comprising a first organic polymer deposited over the conductive barrier layer.

20 4. The composite substrate of claim 2 further comprising a second organic polymer deposited over the conductive barrier layer.

25 5. The composite substrate of claim 1 further comprising one or more additional layers of conductive barrier material deposited over the plastic substrate, the additional layers of conductive barrier material having the same material as the first conductive barrier material.

30 6. The composite substrate of claim 5 further comprising one or more additional layers deposited over the previously deposited conductive barrier material layer, respectively, each additional layer including one of an organic polymer, a thin transparent dielectric, a thin transparent metallic film and a thin transparent conductive oxide.

35 7. The composite substrate of claim 1 wherein the thin transparent metallic film is aluminum.

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8. The composite substrate of claim 1 wherein the thin transparent metallic film is silver.

9. The composite substrate of claim 1 wherein the plastic substrate is one of a polyester and a polyolefin.

10. The composite substrate of claim 1 wherein the transparent conductive oxide coating is tin doped indium oxide.

11. The composite substrate of claim 1 wherein the transparent dielectric barrier is one of silicon oxide and aluminum oxide.

12. The composite substrate of claim 11 wherein the aluminum oxide is deposited by one of evaporation of the aluminum which is then converted to an oxide in an oxygen plasma and electron beam evaporation.

13. The composite substrate of claim 1 wherein the dielectric layer is deposited by a plasma assisted chemical vapor deposition process using one of an oxidizing carrier gas and inert carrier gas.

14. The composite substrate of claim 7 wherein the aluminum layer is deposited by one of vacuum metallizing and sputtering.

15. The composite substrate of claim 1 further comprising multiple alternating layers of vapor deposited crosslinked organic monomer, and transparent conductive oxide.

16. An apparatus for fabricating a composite substrate for use in flat panel display packaging comprising one of a roll coater, a vacuum coater, an in line coating machine and an intermittent motion machine and a Gravure coating machine.

17. The apparatus of claim 16 wherein the substrate is coated using more than one apparatus.

18. A process for fabricating a composite substrate for use in flat panel display packaging comprising:

5 providing a plastic substrate; and  
depositing a first conductive barrier material over the plastic substrate, the conductive barrier material including one of a thin transparent conductive oxide, and a metal nitride.

10 19. The process of claim 18 further comprising depositing a first organic polymer over the plastic substrate.

15 20. The process of claim 18 further comprising depositing a first organic polymer over the conductive barrier layer.

21. The process of claim 19 further comprising depositing a second organic polymer over the conductive barrier layer.

20 22. The process of claim 18 further comprising depositing one or more additional layers of conductive barrier material over the plastic substrate, the additional layers of conductive barrier material having the same material as the first conductive barrier material.

25 23. The composite substrate of claim 22 further comprising depositing one or more additional layers over the previously deposited conductive barrier material layer, respectively, each additional layer including one of an organic polymer, a thin transparent dielectric, a thin transparent metallic film and a thin transparent conductive oxide.

30 24. The process of claim 19 further comprising vapor depositing and crosslinking an organic monomer to form the polymer layer.

35 25. The process of claim 19 further comprising liquid smoothing an organic polymer to form the polymer layer.

26. The process of claim 19 further comprising depositing the polymer layer over the previously deposited layer before the previously deposited layer contacts a surface.

27. The process of claim 18 wherein the thin transparent metallic film is aluminum.

28. The process of claim 18 wherein the thin transparent metallic film is silver.

29. The process of claim 18 wherein the plastic substrate is one of a polyester and a polyolefin.

30. The process of claim 18 wherein the transparent conductive oxide coating is tin doped indium oxide.

31. The process of claim 18 wherein the transparent dielectric barrier is one of silicon oxide and aluminum oxide.

32. The process of claim 31 further comprising depositing the aluminum oxide by one of evaporation of the aluminum which is then converted to an oxide in an oxygen plasma and electron beam evaporation.

33. The process of claim 18 further comprising depositing the dielectric layer by a plasma assisted chemical vapor deposition process using one of an oxidizing carrier gas and inert carrier gas.

34. The process of claim 27 further comprising depositing the aluminum layer by one of vacuum metallizing and sputtering.

35. The process of claim 18 wherein the transparent conductive oxide is deposited by sputtering.

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5 36. The process of claim 35 further comprising providing hydrogen in a plasma of a vacuum chamber used in the sputtering process of the transparent conductive oxide.

37. The process of claim 18 further comprising mildly annealing the substrate before deposition of layers thereon.

10 38. The process of claim 37 wherein the substrate is annealed to approximately 65°C.

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